Error estimation by radiative transfer model on measurement of volcanic SO2 flux with ultraviolet remote sensing

Keiichi Fukui[1]; Teruo Aoki[1]; Katsuyuki Kuchiki[1]

[1] MRI

We evaluated the various effects in the radiative transfer process for the volcanic SO_2 flux measurements with the ground-based ultraviolet remote sensing technique, such as COSPEC, COMPUSS (Mori *et al.*, 2007), and SO_2 camera (ex. Mori and Burton, 2006). The advanced radiative transfer model for the atmosphere-snow system (ARTMASS, Aoki *et al.*, 2002) was applied to this evaluation. The factors in error source are distance from station to plume, plume height, solar zenith angle, horizontal angle from plume to sun for a panning method, amount of ozone, aerosol, cloud, and wavelength.

Major results are as follows (the numerical values are the the resuts for 309 nm) :

(1) Panning method was caused on the SO_2 of the large under estimate from scattering by a distance from station to plume

(2) Panning method was caused on the SO_2 of more than 10 % error for the horizontal angle between the filed of view and the sun. This error is maxim at direction of the opposite of the sun.

(3) Traverse method was caused on the SO_2 of the smaller error from the plume height than effects of the distance in the panning method.

(4) Traverse method was caused on the SO_2 of the large error from effects of the solar elevation. The over estimations of 60% is caused at the solar elevation of 30 degrees.

(5) But, the solar elevation does not affect the measured SO_2 amount under the condition that the atmosphere is obscured by clouds over the SO_2 layer.

(6) The seasonal variation of ozone does not affect the estimation of SO_2 amount.